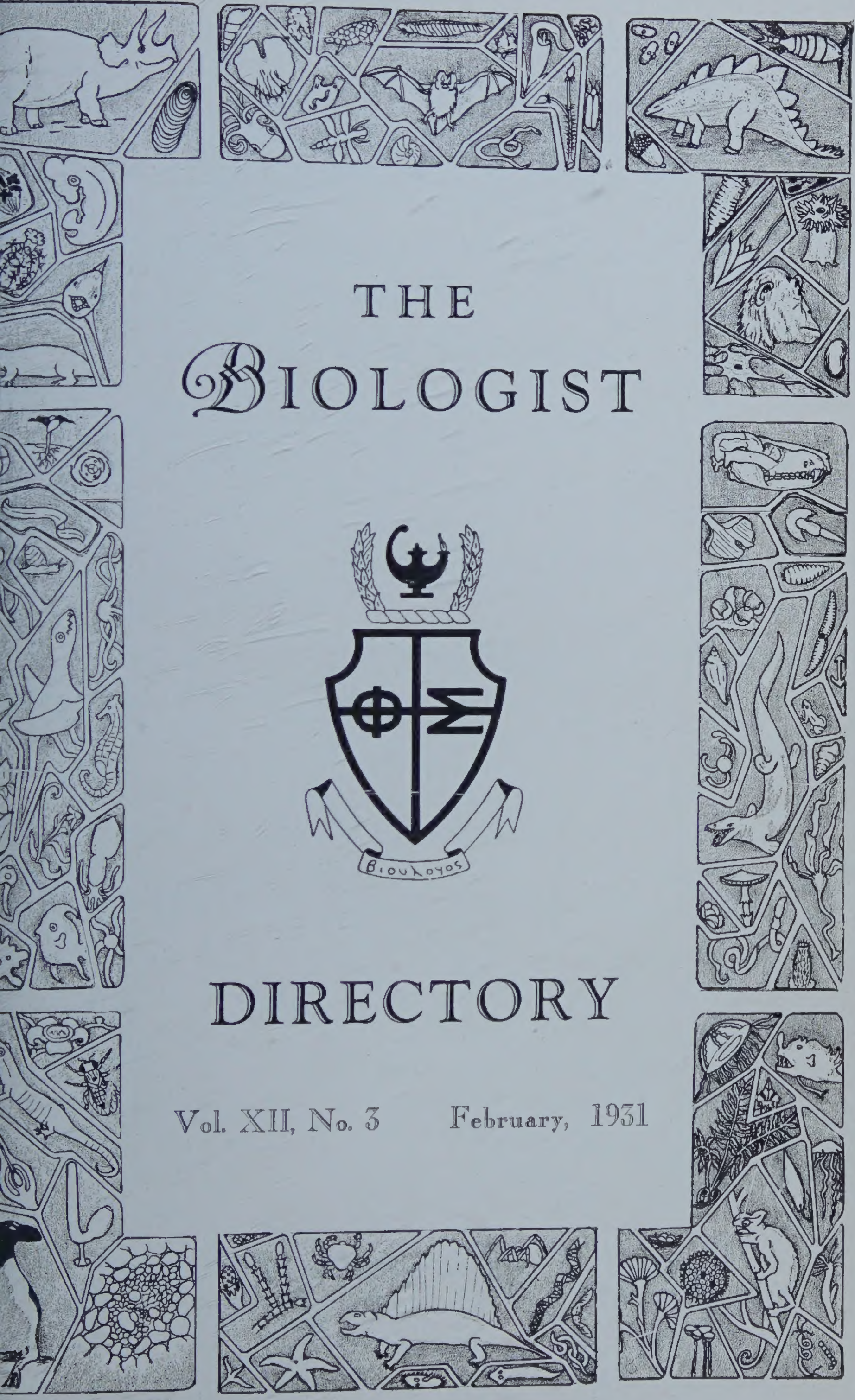

THE BIOLOGIST

DIRECTORY

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THE BIOLOGIST

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OF THE

PHI SIGMA SOCIETY

Volume XII Denver, Colorado, February, 1931 Number 3

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PHI SIGMA SOCIETY

An Organization Devoted to the Promotion of Interest in Research
in the Biological Sciences, Founded Ohio State
University, March 17, 1915.

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THE NEW VICE-CHANCELLOR'S PLEDGE

⁂

"Say to the Chapters of Phi Sigma that I am very proud to be honored by them, and that I shall do everything in my power to promote the best interests of the fraternity."

DR. PAUL A. WARREN

THE BIOLOGIST

Volume XII February, 1931 Number 3

THE NEW VICE-CHANCELLOR PAUL A. WARREN

Biennial Election Results in Council Changes

The 1930-31 convention of Phi Sigma elected Dr. Paul A. Warren of the College of William and Mary, Williamsburg, Virginia, to the office of Vice-Chancellor as successor to Dr. Anselm M. Keefe, who declined re-nomination. Dr. A. I. Ortenburger of the University of Oklahoma, Norman, Oklahoma, was unanimously re-elected Secretary. In order to relieve him of some of his work, Dr. Keefe was appointed Editor of the BIOLOGIST.

Dr. Warren is a native of Maine, born in Dover, June 22, 1893. He began his biological work under Dr. M. A. Chrysler at the University of Maine and graduated with a B.S. in Biology in 1915. During his undergraduate years he was a Delta Tau Delta, president of the local chapter of Alpha Zeta, Manager of Track, and in 1914 Secretary of the New England Intercollegiate Athletic Association.

After his graduation, young Warren was sent by Dr. Chrysler to Dr. A. F. Blakeslee of the Carnegie Institution, at Cold Spring Harbor, as an assistant in plant breeding. In the Fall of 1917 Dr. H. H. Bartlett of the University of Michigan offered him a fellowship with the idea of taking him along to Sumatra as an assistant in breeding rubber trees. This fell through, however, due to the intervention of the War. Warren entered the Medical Corps as a bacteriologist and spent two years in the service, fifteen months of which were devoted to epidemiological work in France.

''Upon my return,'' writes Dr. Warren, ''I was again offered the fellowship at Michigan and worked there from 1919 to 1922 on Oenotheras and Tomatoes. The tomato breeding project arose from my contact with the Jerome B. Rice Seed Co. through Mr. Wilber Brotherton, and, curiously enough, my doctorate thesis was written on the tomato instead of the Oenothers as originally intended.''

During the Michigan years Dr. Warren met, and married the future Mrs. Warren,—a story not without interest to Phi Sigma members. At the Gamma Alpha house where Dr. Warren lived was a young zoologist by the name of Ortenburger. Although both young men had a common interest in the biological sciences, there was a stronger bond of comradeship than that stimulated by textbooks or laboratory contacts. It centered around the Tri-Delt house, where the future Mrs. Warren and the future Mrs. Ortenburger, were not only sorority sisters, but also room-mates. The marriages took place during the same June week in 1921.

In 1922 Dr. Warren received his Ph.D. at Michigan and in the same summer he moved to Virginia where he had accepted a cooperative position as Head of the Department of Botany and Pharmacognosy at the Medical College of Virginia in Richmond, and at the same time Associate Professor of Biology at the College of William and Mary. In 1928 the Medical College work was given up and Dr. Warren became Professor of Botany at William and Mary. In the last nine years the department of Biology has grown from less than a hundred to more than four hundred students. Elementary course enrollment has increased from forty to two hundred and seventy. Two full major courses of thirty semester hours each are now being offered.

In the Fall of 1923 interested scientists were brought to Williamsburg and the Virginia Academy of Sciences was organized. Dr. Warren was secretary of the biological section in 1925, and chairman of the botany section last year. He has served continuously on the Conservation Committee and on the Committee on the Flora of Virginia. This last group, under the chairmanship of Dr. Ivey F. Lewis of the University of Virginia, has recently published an excellent "Flora of Richmond and Vicinity." Dr. Warren was chairman of the local committee at the largest of the Academy's sessions,—that in Williamsburg in 1928,—an experience which will stand him in hand in the biennial gatherings of Phi Sigma.

Last year the University of Virginia organized a summer station at Mountain Lake in southwestern Virginia. It is known as the "University of Virginia Biological Station," and makes its bid in the summer school world as offering graduate summer courses in the field. Dr. Warren has charge of the graduate course in Plant Taxonomy and Ecology to be offered this summer. Courses are being offered at the station both in zoology and botany. Phi Sigma members interested in a profitable summer on the mountain at a wonderful resort would do well to contact Dr. Warren.

Busy with three five-hour courses throughout the year. Dr. Warren has had little time for genetic research. He has confined his interests chiefly to the cytology of *Impatiens*, the accumulation of data on which, however, is a slow process.

On the William and Mary campus Dr. Warren has a reputation for being "hard boiled." It has proved no deterrent from his also being one of the most popular members of the faculty. He does not confine his interests to the campus, however. He is chairman of the Court of Honor for the Williamsburg Boy Scouts, and Commander of Post 39 of the American Legion.

Dr. Warren is a member of:

Phi Sigma, Phi Beta Kappa, Sigma Xi, Alpha Zeta, Delta Tau Delta, Chi Beta Phi, Gamma Alpha, Omicron Delta Kappa, Phi Delta Chi; the American Association of University Professors, Virginia and Michigan Academies of Science, the Botanical Society of America, a Fellow of the A. A. A. S.; A. F. and A. M., and the American Legion.

THE NATIONAL CONVENTION

The 1930-31 convention at Cleveland will go down in the history of Phi Sigma as second in importance only to the Washington convention of 1924-25 when the chapters met to reorganize and redraft the present constitution.

There were many contributing factors. Throughout the country times were hard, and no one felt it more acutely, perhaps, than the students,—both graduate and upper-class, who constitute the membership of Phi Sigma. The delegates who came to Cleveland, and the chapters they represented, looked with anxious eyes to the forthcoming session for action that would further stabilize our growing society.

The convention did not fail the chapters in their expectations. If any delegate went back to his chapter without a very definite idea of the working, the resources, and the ideals, of the society, it certainly was not the fault of the convention.

That Phi Sigma is still in the plastic stage of youth has been redemonstrated. In many of the deliberations and most of the actions initiated and sponsored by the delegates there is ample evidence that the dust of tradition has not yet gathered so thickly on Phi Sigma as to make one wonder whether it were a living organism in a state of coma, or already fossilized.

The minutes of the meeting have gone to the chapters in mimeographed form. Careful study will reveal the fact that there are still many unsolved problems before the society. To rush them all through to final conclusions would have been as logical a process as to accept the saltation theory as an explanation of ontogeny.

Much has been accomplished, more remains for the future. If each chapter will adapt itself to render the utmost in service to its own particular campus,—at the same time keeping itself an integral, active part of the whole society, and maintaining its contacts with other chapters,—there is no doubt that Phi Sigma will blaze a new trail through the jungle of organizations that have sprung up in our educational system. Time and circumstance will work their own changes. The Phi Sigma of yesterday may no more resemble the Phi Sigma of tomorrow than the Archeopteryx resembled the Condor. But that is the story of Life.

PHI SIGMA TITLE PATENTED

Information from the Office of the Secretary to the effect that the name, or term, "Phi Sigma," now belongs to our organization alone, will be of interest to every member of the fraternity.

On February 24, 1931, the name "Phi Sigma" was registered in the United States Patent Office as a trade-mark. This gives the Society undisputed possession of the title. Any other organization, firm, etc., attempting to use our name as a distinctive designation becomes liable to prosecution for so doing.

Members of Phi Sigma will rejoice in this action. It is not so long ago that a nationally known motion-picture company released a collegiate comedy of rather uproarious nature in which a pseudo-social fraternity named "Phi Sigma," came in for some good-natured "razzing." There is also a private dancing-club in existence somewhere in the United States which goes by the same name.

According to *Baird's Manual* there was once a social fraternity by the same name. We quote: "The secret Phi Sigma League was founded at Lombard University, Galesburg, Illinois, by several students of the class of 1857. It established chapters at Knox College, Monmouth College, Northwestern University, Hedding College, Abingdon College, Eureka College and Jefferson College (Wis.), but none were prosperous and they soon ceased to exist. The parent chapter joined Phi Delta

Theta in 1879. There were three degrees in the society. The two lower ones were for undergraduates, and were called the "Anchor" and "Harp", and these emblems were worn as badges." *Baird's Manual, American College Fraternities,* 12th Ed., p. 655.

There is a local fraternity at Rhode Island State College which goes under the name of Phi Sigma. All that is thus far known about it is that it was organized in 1925.

Abstracts of Convention Papers

There can be no question in the mind of anyone who has studied the General Program of the Fourth Cleveland Meeting of the A.A.A.S. that Phi Sigma made a creditable showing. Pages 125 to 128 contained the list of papers to be read during the scientific sessions of the society. In sponsoring this special program offering younger scientists an opportunity to present the results of their investigations, as well as giving its own graduate members a chance to make preliminary announcements of forthcoming papers, Phi Sigma is filling a unique place in the world of biological research. No other Greek letter organization is listed in a similar fashion.

The following abstracts are all that have thus far been turned in. It seems unwise to delay the publication of the BIOLOGIST any longer in the hope of securing the missing abstracts. The list of titles and the abstracts is presented here exactly as the program was carried out at the sessions.

1. THE RELATION BETWEEN SALTS AND GROWTH AND REPRODUCTION OF *Ameba proteus* LEIDY.

Donald M. Pace, Duke University. (No abstract.)

2. SOME OKLAHOMA ROTIFERS.

Clarence E. Taft, University of Oklahoma.

The following material represents collections over a period of only three months.

The majority of the collections have been made in the vicinity of Norman and Oklahoma City. This is true of all except two, one being from the Wichita Mts. and the other from the Salt Plains region.

The following identifications have been made:

Anuraea cochlearis var. macracantha
Brachinonus mulleri
Calurus grallator
Cathypna luna
Diaschiza sp.?
Eosphora digitata
Eretmia cubeutes
Floscularia campanulata
Floscularia sp.?
Monostyla oxysternon
Monostyla solidus
Monostyla sp.?
Notomata sp.?
Philodina roseola
Salpina spinigera
Stephanops sp.?

Of this group, Branhionus mulleri is the most interesting because of the fact that it is a marine species. It was collected in the Salt Plains region, and suggests the possibility of a unique inland rotifer fauna.

3. THE VALIDITY OF THE VISCOMETRIC AND WOHLGEMUTH METHODS FOR THE QUANTITATIVE ESTIMATION OF AMYLASE.

Leon C. Chesley, Duke University.

Using four different lots of commercial starch, and keeping constant all factors except the starch used as substrate, widely discordant results were obtained in the different digestion experiments. The discrepancies ranged from 20% to 200%, when expressed in units of amylase. It is tentatively suggested that these disconsonant results are due to either varying proportions of amylodextrin and amylopectin in the different starches, or to varying amounts of some inhibitory chemical in each.

4. THE ROLE OF CELL INCREASE AND CELL SIZE IN GROWTH IN BEE LARVAE.

Herbert E. Warfel, University of Oklahoma.

The cellular structure of bee larvae 0.5 day, 1.1 day, and 2.0 day after emergence from the amniotic sheath in an attempt to explain from a cytological standpoint the rapid growth that takes place in the first 48 hours of the larval period is here reported.

Cell counts reveal actively proliferating cells in the hypodermis and silk glands, fat cells, trachae, and muscles. The greatest activity takes place in the gut epithelium, trachea, and nervous system in the larva of 0.5 day: activity is greater in hypodermis and silk glands of the larva of 2.0 days. Of the fat cells 78 per cent are active in the 0.5 day stages and 100 per cent in the 1.1 day and 2.0 day. Mitosis is lacking in the gut in the 1.1 day and 2.0 day stage and in the muscle and nerve in the 2.0 day.

The velocity of cell division reaches a peak during the last half of the first day and is proportional to the increase in cell number at the 1.1 day stage.

The fat body is considered the most important tissue in the larvae from the standpoint of growth. The greatest increase in mitotic activity takes place there.

A physiological relationship between the fat cells and the cells of the gut epithelium is suggested.

Cell size is a factor; cells of the three most prevalent tissues were measured on their greatest diameter. Hypodermis ranged in size from a mean of 4.14μ in the 0.5 day to 6.37μ in the 2.0 day; fat cells from 5.76μ in the 0.5 day to 12.17μ in the 1.1 day and fell to 11.81μ in the 2.0 day stage; while the gut epithelium had a range from 6.81μ to 21.34μ.

5. THE INFLUENCE OF INSULIN ON GLYCOGEN DISTRIBUTION IN MARINE FISHES.

R. W. Root, Duke University.

Blood sugar, muscle, and liver glycogen were determined in control and insulinized Scup, *Stenotomus chrysops* (Linnaeus). Hyperglycemia was observed for a period of about 3 hours after insulin injection; this was followed by increasingly pronounced hypoglycemia that continued to the end of the experiment (experiment ended at the 14th hour after insulin injection). Liver glycogen gradually decreased until only about 5% of the normal value remained in the liver. Muscle glycogen gradually increased until convulsions occurred in the fishes. It appeared that insulin caused increased storage of muscle glycogen at the expense of liver glycogen and blood sugar.

6. THE ORIGIN OF THE GERM CELLS IN EARLY EMBRYOS OF *Sternotherus odoratus* (LATREILLE).

Paul L. Risley, University of Michigan. (Lantern—8 minutes).

In embryos of 1-3 somites, certain cells, which are identical with the undifferentiated cells of the ventral part of the primitive knot, are found in the extra-embryonic entoderm along the postero-lateral edges of the area pellucida. Their later history shows them to be primordial germ-cells, which may be traced from their extra-regional position to one in the developing gonads via the mesentery. The germ-cells of the embryonic gonads are produced only by the mitotic divisions of the primordial germ-cells. The evidence derived from this study confirms the findings of the majority of other investigators on reptilian species.

7. PRELIMINARY NOTES ON MAMMALS OF THE REGIONS ADJACENT TO THE SALT PLAIN AREAS OF NORTHWESTERN OKLAHOMA.

Herbert E. Warfel, University of Oklahoma. (No abstract.)

8. A PRELIMINARY REPORT OF THE EFFECT OF THE FEMALE SEX HORMONE ON THE GROWTH CURVE OF WHITE RATS.

H. J. Spencer, University of Denver.

There is evidence that the injection of oestrin results in an inhibition of the hypophysis as regards production of the sex factor hormone. We wish to see whether this inhibition also applies to the growth factor. Rats just weaned were injected for a period of two months and then growth curves compared with litter mate controls.

A significant difference in growth rate was observed; the total gain by the injected animals being 20-25% less. A marked atrophy, in some cases almost complete disappearance of the testes of the injected males resulted. A complete histological study of the endocrine system will be made.

9. A PRELIMINARY REPORT OF THE COMPARATIVE ACTION OF THE FEMALE SEX HARMONE ON THE RAT AND THE MOUSE.

T. J. Becker and C. H. Mellish, University of Denver.

Assuming that oestrin has therapeutic values, it becomes of primary importance to establish an accurate unit of standardization.

For such determinations both rats and mice have been used. Most workers in the United States use rats, while in Europe they prefer mice. Since the relative value of the two is uncertain, an accurate correlation is essential. A curve for both rats and mice will give an approximation of desired evidence.

The method of determination of the rat unit as set up by Coward and Burns, and substantiated by D'Amour and Gustavson, is being used in this experiment on both rats and mice.

10. SKIN MEASUREMENTS.

Charlotte G. Morrell, University of Denver. (By Title.)

Four colors are combined in the color of the skin, black, red, yellow and white. Survey consisted of 100 students at the University of Denver, 50 female and 50 male. The method employed was taken from C. B. Davenport. The equipment consisted of a Bradley color top, and a pair of tweezers to adjust the color top, also a neutral background of gray material. Many factors enter in the test, light, time and background are important. A study of the individual graph shows that the colors red and white; and black and yellow are closely grouped. The black color varies as to sex, as does the red color. The yellow color in the male group shows outstanding cases, while the female group runs regular. The percentage of white in both groups runs very high. In conclusion: the colors vary according to sex, in all cases the Maximum Frequency is closely followed by two sub groups showing the true range.

11. THE INFLUENCE OF NATURE OF THE INDIANS OF EASTERN COLORADO.

Dale S. King, University of Denver. (By Title.)

Influence of Nature on Indians of Eastern Colorado. In summer of 1930 an archaeological survey of Eastern Colorado by a joint expedition from the University of Denver, Smithsonian Institution, and Colorado Museum of Natural History studied territory within the state line and east of foothills. Cultural traits of primitive inhabitants evidently were influenced by physical geography. Petroglyphs, obviously, are found only in the southern part of the area where there are cliffs and rocks suitable for such purposes. Indians came from many directions to obtain petrified wood from the Black Forest region with which to make implements. Implements of this material are common in the region, while those made from quartzite abound in northwest and southeast portions. A bituminous limestone is much used in the Arkansas Valley. Pottery of Plains type seems to be found mostly in campsites which lie near river drainages—permanent camps, in other words.

12. EXPERIMENTS IN FORCING GLADIOLUS.

S. W. Decker, University of Illinois.

It has long been the dream of the florist to have gladiolus in flower for Christmas. Experiments were undertaken to see if this was commercially possible. A number of chemicals which have proven useful for the breaking of rest periods or stimulating flowering were tested for their effect on the gladiolus. Ethylene dichloride gave some stimulation but the results were erratic and unreliable. Corms forced into growth by chemicals shortly after harvesting made poor vegetative growth and failed to flower.

Corms held over summer in cold storage and planted September to December made good vegetative growth but produced few flowers, while corms of the same treatment planted in January gave 115 per cent flower.

Corms grown in California and harvested in April and June were obtained and planted in the greenhouse October 1. Those corms appeared to grow normally. The April harvested corms gave 37 per cent flower, while the June harvested gave 29 per cent flower. Corms given identical cultural conditions, except that the length of day was prolonged by the use of electric lights, gave 92 per cent flower for the April harvested and 75 per cent for the June harvested corms. The prolonged day caused the corms to bloom on an average of about 10 days earlier than the check, but no difference could be seen in quality of blooms as measured by length of stem and number of buds.

Examination of the plants failing to flower showed that the flower buds had developed, and died at various stages of development. In all cases the buds appeared to be blasted and no fungus or bacterial disease was evident.

13. A HITHERTO UNDESCRIBED METHOD OF SCLEROTIUM FORMATION.

Erdman West, University of Florida.

While investigating the host range of the fungus *Rhizoctonia microsclerotium* Matz, opportunity arose to observe the various stages in the formation of sclerotia of this fungus. It is peculiar in that each individual sclerotium is the result of the regular and diffuse branching and budding of a single specialized hyphal branch. Hitherto described sclerotia are the result of the intertwining and coalescing of several hyphae.

14. A SURVEY OF THE DESMIDS OF OKLAHOMA.

Clarence E. Taft, University of Oklahoma.

The study of the Desmid Flora of Oklahoma was begun in September, 1929, under the direction of the late E. C. Angst.

The need for such a study was apparent from the fact that very little work in this group had been done in the Southwest.

Collections, although from widely separated points have roughly included the entire state, as the following localities indicate:

1. The Kiamiche Mts. in the southeast corner of the state.
2. The Arbuckle Mts. in the south central part.
3. The Wichita Mts. in the southwest corner.
4. The Salt Plain region in the northwest part.
5. The Ozark foothill region in the extreme northeast corner.
6. The central region about Norman, and its environs.

To date a total of twenty genera and seventy species have been recorded. Below are listed the genera with the number of species identified under each.

	Genera	*Species*
1.	Gonatozygon	1
2.	Spirotaenia	1
3.	Spondylosium	1
4.	Mesotaenium	1
5.	Cylindrocystis	2
6.	Penium	2
7.	Netrium	3
8.	Roya	1
9.	Closterium	9
10.	Pleurotaenium	2
11.	Tetemorus	1
12.	Cosmarium	28
13.	Euastrum	3
14.	Micrasterias	4
15.	Xanthidium	1
16.	Staurastrum	6
17.	Hyalotheca	1
18.	Desmidium	1
19.	Sphaerozosma	1
20.	Onychonema	1

15. ELIMINATION OF FALSE CONFIRMATORY TESTS FOR ESCHERICHIA COLI IN WATER ANALYSIS BY THE USE OF EOSIN-METHYLENE-BLUE AGAR.

Mary Louise Davenport, University of Montana.

A number of persons engaged in routine water analyses have observed the formation of acid and gas in lactose broth when daily examination has shown that Bacillus coli has not been present in sufficient quantity to cause the gas production. Further, when these samples were streaked on Endo's agar, typical coli colonies were produced.

Organisms producing false tests have been described by Meyer, Hinman and Levine, Norton and Weight, and others. To eliminate these false presumptive tests gentian violet and brilliant green bile have been reported as being effective.

Since the sporeformer produces a colony on Endo's agar, easily mistaken for a typical colon colony, some media on which this does not occur would seem desirable. Eosin-Methylene blue agar seems to satisfy these requirements.

16. A QUICK METHOD OF STAINING PARAFFIN MOUNTS OF DISEASED PLANT TISSUE.

Kenneth W. Loucks, University of Florida.

A short method of staining plant tissue that has been cut from paraffin blocks is given. Gentle heat is substituted for dehydration by alcohol. This makes possible the use of stains which are easily washed out with alcohol and opens possibilities for better differential staining.

17. A SHORT METHOD OF PREPARING SECTIONS OF BACTERIALLY DISEASED PLANT TISSUE WITH THE FREEZING MICROTOME.

Kenneth W. Loucks, University of Florida.

A description is given of a method for using the freezing microtome for a quick examination of plant tissue. A preliminary killing of the tissue is recommended and a method for staining and handling the cut sections is given.

18. SOME PHYSICO-CHEMICAL PROPERTIES OF CELL SAPS IN PLANTS, WITH SOME STUDIES OF TRANSPIRATION, AND THEIR RELATIONSHIP TO THE PHYSICAL ENVIRONMENT.

Glenn A. Greathouse, Duke University. (By Title.)

Since tissue analyses are unsuited for most physiological work, sap analyses have been used in this investigation. In sap analyses rapid, simple, accurate and standard methods are necessary for an extended study of the physiology of any plant. A small but powerful hydraulic press, equipped with a test cylinder 1⅛ in. in diameter, with necessary filters and accessories were used for the obtaining of the sap samples. Different methods of treating the tissue before applying pressure were tried out. The "dry ice" treatment proved to be most satisfactory for this investigation. The amount of sap obtained from a given sample depends on the size, water content, kind of tissue and on its treatment. A uniform time of draining and a uniform pressure were used. The following procedure was used as a standard: 50 gram sample of tissue was subjected to 5000 lbs. per sq. in. and drained for five minutes after maximum pressure was reached.

The water content of the tissue was obtained from a duplicate sap sample and the water left in the press cake.

The total solid matter content of the sap was obtained by the refractometer, and was checked by drying a known quantity of sap in the oven at a temperature of 65°-70°C. The freezing point was determined by the usual freezing point apparatus, with the use of a Beckman thermometer.

The transpiration studies were made on attached leaves, by using the thermo-electrical method and measuring their departures from the temperature of the air. A sensitivity wall galvanometer, provided with a telescope and scale was used to measure this departure.

The osmotic concentration indicates an increase with the age of the leaves and a decrease with the height of their insertion, until a certain stage in the development of the plant. The leaves were found to be progressively cooler from the older toward the younger until leaves of four days old were reached. There seems to be a relatively high correlation between leaf-temperature and depression of the freezing point under certain physical conditions, which indicates a close inverse relationship between the changes in leaf-temperature and in the concentration of the extracted juices.

19. A New Species of the Genus Oochoistia from the Skunk.

Wilbur E. Deacon, University of Nebraska.

Genus diagnosis: Genital pores irregularly alternate, genital ducts pass ventrally to the longitudinal excretory vessels.

A large number of cestodes were collected from the small intestine of a Maine skunk (Mephitis mephitica). It was determined that they belonged to the genus Oochoistica and that they must be, according to the following differences, a new species.

Oochoristica n.sp.—

Cirrus sac practically spherical, Outpocketings extending from the exterior genital pore both ventrally and dorsally.

Another cestode has been collected from the Nebraska Civet cat and may prove to be another new species in this same genus.

20. A Preliminary Study of Certain Wing Muscles of North American Perching Birds.

Gearge E. Hudson, University of Nebraska. (By Title.)

This work was done at the University of Nebraska in 1929-1930, under the supervision of Dr. Robert H. Wolcott. Specimens of sixteen families of perching birds were studied with the idea of finding myological facts of taxonomic value. The common crow was used as a type, and attention was concentrated upon the muscles of the forearm and hand. In the study of the crow several apparent discrepancies were found in Shufeldt's work on the raven. Perching birds are a very uniform group as regards the wing musculature, but the Clamatores are markedly different from many families of Oscines. The Corvidae are also unique in certain respects.

21. Some Effects of Age Upon the Rate of Mutation in *Drosophila.*

Mildred A. Groscurth, University of Oklahoma. (No Abstract.)

22. Pollination Studies with the McIntosh Apple in New Hampshire.

L. P. Latimer, University of New Hampshire.

Three years results of hand pollination tests on caged McIntosh trees show that of the varieties used as pollenizers Delicious, Wagener, Early Harvest, Cortland, and Wealthy produce fruit on more than 50% of the blossoming McIntosh spurs, and are therefore reliable pollenizers. Pollen of Oldenburg and Red Astrachan also gave a satisfactory set when compared with open orchard pollination.

On the other hand, Gravenstein, Baldwin, and McIntosh pollen produced an insufficient amount of fruit on McIntosh trees for commercial purposes, the set in no case being over 14% on the spur basis. The correlation between set of fruit induced by different pollenizers, number of seeds produced, and size of fruit was such as to indicate that when the orchard is amply provided with pollenizers, the amount of fruit harvested, and the size of the fruit are greater than where pollenizers are infrequent. The shape of the fruit is materially improved when better pollination takes place.

23. Further Studies in the Cytology of Cilia Formation in the Swarm Spores of *Reticularia lycoperdon* Bull.

F. B. Cotner and Mildred A. Porter, Montana State College.

The works of E. Jahn and of M. Wilson and E. G. Cadman fail to show a number of important stages in the initiation and early development of the cilium in Reticularia lycoperdon Bull. The writers have studied a complete series of stages in the process of the formation of the cilium in the swarm spores of this plant. A definite basal apparatus consisting of a definite blepharoplast and two additional chromatic granules is shown. The behavior of these granules during cilia-formation is discussed in some detail and accurate camera lucida drawings of various stages in this process are shown.

24. *Habrobracon Juglandis* as Material for Genetic Research.

Lysbeth Hamilton Benkert, University of Pittsburgh.

The simple technique of raising Habrobracon and the genetic ratios obtained from virgin females make it an exceptionally good type for genetic research. The life cycle is ten days but individuals may be kept for over a year at a low temperature. Among problems of especial interest presented by Habrobracon are those on mosaics, including sex mosaics, which presumably arise from binucleate eggs. The stinging and oviposition reactions of Habrobracon are much more complex and definite then oviposition in Drosophila and as a consequence offer numerous problems in the study of behavior.

25. Genes and Gene-Changes in *Habrobracon.*

Milton F. Stancati, University of Pittsburgh.

Despite the relative recency of initiation of genetic studies on the parasitic wasp, Habrobracon, its genes have already been partially mapped. At least three well-marked linkage groups have been found, and more factors are being steadily added to those or excluded from them. Of these factors, most affect the eyes, others the wings, legs, or antennae; many produce multiple effects; some are dependent on temperature conditions for their expression.

X-rays produce lethality, total or partial sterility, or visable mutations, according to the dosage; they also noticeably increase the mutation rate.

26. Biparental Males in *Habrobracon.*

Magnhilf F. Torvig, University of Pittsburgh. (By Title.)

Biparental males, unlike their impaternate, haploid brothers, resemble their biparental, diploid sisters in showing the dominant traits of both parents of a cross rather than merely those of their mother. There may be a sex chromosome for which these males are simplex though so far no mutation has been located in the sex chromosome. Biparental males produce few, sterile and, supposedly, triploid daughters. By selection it is possible to vary the ratio of biparental males to total diploids as well as the number of fraternities producing them. Temperature affects the rate of production of biparental males.

27. Experimental Hybridization in the Lepidoptera.

Walter R. Sweadner, University of Pittsburgh.

The species used in this experiment were of the families Saturniidae and Sphingidae. To secure cross-mating, the male was attracted to the desired female by a female of its own species, the two were forcibly mated, or a modification of Dr. L. R. Watson's method for artificially enseminating queen bees was used. Larvae from crosses between Samia gloveri and S. cecropia had markings intermediate between those of the parent species. They had very delicate skins which resulted in a high mortality in ecdysis and in considerable malformation. Two broods lost the feeding instinct, one in the first and the other in the last instars, and finally died of dessication.

28. The Respiratory Cycle in Turtles (*Chrysemys elegans* and *Chrysemys belli*) with Notes on the Occurrence of Respiratory Rhythms.

Ralph J. Shaw and Francis M. Baldwin, University of Southern California.

By connecting a tambour to a rubber sleeve, fitted around the head of a turtle, it is possible to record on the kymograph the sequence, rate, and frequency of the animal's respiratory movements. Intake and outlet valves being provided, air can be supplied to the turtle while continuous records are being taken. Each respiratory cycle begins with complete expiration, followed by deep inspiration and slight expiration. The duration of a cycle varies from 1.5 to 4 seconds. Breathing is periodic; two, three, four, five, seven, or other rhythms of cycles being followed by apnea. The pause may continue longer than thirty minutes.

29. The Regeneration and Dedifferentiation of Edwardsiella Californica.

Minnie Yonge, University of Southern California.

Edwardsiella Californica is a burrowing Coelenterate found on the mud flats of the Pacific coast. When these animals are cut in halves, thirds, quarters, or fifths, the sections develop new bulbs and tentacles. The new growth formed is the result of the dedifferentiation of tissue at the cut ends. Successive divisions show the formation of new tentacles and bulbs but the rate of regeneration is reduced.

Heteromorphic heads are easily produced by making incisions through the body walls, and mesenteric chambers in the stomodeal region.

There is no definite polarity in the sections made in the stomodeal region, but ligatures in the medion part of the body may modify the polarity.

30. THE LIFE CYCLE OF EIMERIA MAGNA IN THE DOMESTIC RABBIT.

Robert L. Rutherford, University of Southern California.

Eimeria magna is one of four species of Coccidia infecting the intestinal tract of domestic rabbits. By raising rabbits on sterilized food, one is able to get the animals practically free from Coccidia. These animals may then be infected with the species desired and the exogenous and endogenous cycle studied. By proper fixation and staining of the intestinal tissues one is able to follow the endogenous cycle of the parasite in the intestinal epithelium. The exogenous cycle can be followed by tracing the development of the central oocyst mass into its sporozoites.

31. A DISCUSSION OF THE LENGTH-BREADTH RATIO OF *Giardia* IN MAN, DOGS AND CATS.

Elizabeth B. Stockford, University of Southern California. (By Title.)

32. TURNING OF THE SPERM OF AN ORTHOPTERAN FOLLICLE.

Claude Gresham Landrum, University of Kansas.

The general description of the follicle showing two general zones and the cause of each zone in each follicle, the description of the dark belt between the zones, the spermatid, their place in the follicle, their movements while developing, and clustering. The sperm cluster, its movement down the periphery and forward up the follicle toward the closed end, the orienting of sperm clusters near the dark belt and the return of these clusters toward the open end of the follicle, the behavior of tail filaments of the sperm during this movement. Passage of the sperm thru the vasa eferentia and thru the vas deferens to the copulative organs. Individual behavior of the sperm clusters.

33. SOME STUDIES OF ANTIGENIC PROPERTIES OF ESCHERICHIA COLI BACTERIOPHAGE.

Alvin Y. Wells, University of Kansas.

1. It seems to be well established that the bacteriophage is antigenic when introduced into the rabbit in the proper manner.

2. Esch. coli bacteriophage developed at the expense of a susceptible organism in a suitable protein free medium, gave no positive protein tests.

3. It was found that the lytic action of the bacteriophage was completely neutralized by the antiphagic serum in a dilution of 1-100 and that the time and temperature were factors in the process of neutralization.

4. It was also apparent that the bacterial anti-bodies could be absorbed out of the antiphagic serum, leaving the neutralizing power of the immune sera unimpaired; and therefore, only neutralizing anti-bodies are produced by the bacteriophage. Also, the action of the neutralizing antibody is directed toward the phage in bringing about inhibition and not against the bacteria.

5. When the proper tests of the antiphagic serum were made, agglutinins were exhibited; but precipitin and complement-fixation experiments were not positive.

34. A CONSIDERATION OF HUNTER'S CRITICISM OF LASHLEY.

S. H. Bartley & F. T. Perkins, University of Kansas.

W. S. Hunter has recently attempted an attack on K. S. Lashley's theory of equipotentiality in brain functioning. In doing so (1) he has inadequately stated his own position; (2) Hunter has not seen the failure of the reflex theory to face the necessary problems in the case; (3) he misconceives the theory of equipotentiality; (4) his introduction of "multiplicity" versus "simplicity" of stimuli is shown to be unjustified and irrelevant; (5) he avoids the facts of re-learning after occipital destruction; (6) he utilizes an unjustifiable dichotomy of "center" and "periphery" in neural explanation; (7) his use of "engrams" is extraneous and inconsistent; (8) he misunderstands the meaning of Gestalt.

35. SOME EFFECTS OF AGE UPON THE RATE OF MUTATION AND UPON VARIATION IN *Drosophila Melanogaster*.

Mildred A. Groscurth, University of Oklahoma.

Five general types of crosses were made: Newborn virgin females x newborn males; aged females x aged males; virgin females, aged for thirty days x newborn males; aged females x newborn males; and aged males x newborn females. A variable, rapidly mutating stock of the Beadex mutant was used, the individuals varying from normal wings to an extreme Beadex. The average number of offspring per cross is decreased. Since this is greatest in the crosses involving the aged male it would seem that the male is the most affected by age. The sex ratio is 1.1 with the exception of a series of crosses where it is 4:1, indicating the presence of a lethal factor. There is a general correlation between the phenotype of the parents and the appearance of the offspring. Variation is affected by age since there is a slight tendency for the appearance of the offspring to shift toward a mean; the less extreme become more extreme and the more extreme less so. The mutation coefficients of the five types of crosses indicate that mutations appear more frequently in the age crosses and that the males are more affected.

36. EFFECT OF AERATION ON THE DEVELOPMENT OF AERENCHYMA IN CERTAIN HYDROPHYTES.

Frieda Roerden, University of Nebraska.

Plants of cat-tail (*Typha latifolia,*) bur-reed (*Sparganium eurycarpum*), and arrow-head (*Sagittaria* latifolia), were grown under four sets of conditions of aeration and water-content, viz.; water-logged soil, soil alternately saturated and drained, moist soil, and dry soil. After eight weeks growth, the roots showed a marked and progressive decrease in air space in the cortex as the degree of aeration increased. This varied in *Typha* from 33 to 14 per cent; from 29 to 17 in *Sparganium;* and from 39 to 13 in *Sagittaria.*

37. SUGGESTIONS ON MAINTAINING CULTURE OF MOSQUITO LARVA THROUGH THE WINTER.

Leon Conrad Glover.

Mosquito larvae make an excellent living organism to work with when studying the surface activity of materials in dilute concentrations. A screened pool was prepared with muck and barrel staves in the bottom. Mosquito larvae of *Culex pipiens* were placed in the pool. Too stagnant water affects the development of the larvae and pupae. Adult males and females were fed on fresh fruit. No egg production was noted. White rats were unsatisfactory as food animals. Egg deposition was noted when females had been fed on blood. Larvae were ready for use from three to four weeks after females were fed blood. With relatively high humidities and temperatures, adults are more active and bite freely.

38. PRELIMINARY SURVEY OF SECONDARY SUCCESSIONS IN THE PINE-OAK REGION OF SOUTHEASTERN OKLAHOMA.

Elbert L. Little, Jr., and Charles E. Olmsted, Oklahoma Forest Service.

This work was undertaken by the writers at the request of Mr. Geo. R. Phillips, State Forester of Oklahoma, during the summer of 1930. A survey was made of the area of the Southeastern Protective Unit of the Oklahoma Forest Service, covering in general, the Ouachita Mts. in Oklahoma. The climax of the region is deciduous forest, *Quercus alba* being the principal dominant. Much of the area is covered, however, by a subclimax of *Pinus echinata*, which is rapidly being cut. Observations were made on successions following moderate and severe cutting of the pine forests and on the effect of fire after cutting, and in virgin stands of pine. Associations present after overgrazing of cleared pastures, and after clearing, cultivation and abandonment were also noted. As a result of the survey, experimental plots were established for an intensive quantitative study of successions following cutting, with and without fire as a factor.

39. OBSERVATIONS ON MIGRATION, MOLTING AND MATING HABITS OF THE RED SPIDER MITE.

Horace L. Caler, University of Maine.

The red spider mite, *Tetranychus telarius* L., is frequently found on greenhouse and conservatory plants, and at times causes serious injury to its hosts. Migration from plant to plant is mainly by means of interlocking foliage. An uninfested plant remained free of the mites when placed near an infested plant with the leaves of the two plants within one-fourth of an inch of each other. If the leaves were allowed to touch, the uninfested plant soon became infested. It was also observed that the mites rarely left a plant unless it had been killed, or for some reason no longer furnished food.

Greenhouse grown corn plants were artificially infested with this prolific arachnid and after a period of several weeks the infestation was general. When the plants became crowded with the spider mites the mites became active as if in the process of migration. Instead of going down the stalk to the ground they crowded upward on the stalk to its tip. Here a mass of squirming mites about one-fourth inch in diameter was formed. Webs were formed in the axils of the leaves and enlarged until they extended outward a distance of two or three inches. The webs frequently were extended from blade to blade throughout the plant. The spider mites crowded up these webs in large numbers and thus increased the size of the living mass of mites at the tips of the plant. As the mass became larger the individuals could not cling together and soon began to drop. Hundreds could be seen dropping down until they came in contact with another web or leaf only to migrate upward again. In general migration was upward in all observed cases.

Molting Process.

The first indication of the molting process is a split in the body covering across the back to the rear of the suture separating the thorax and abdomen. Then followed a split on the under side of the body in front of the two rear pairs of legs. Without an excessive amount of wiggling and squirming the mite now managed to rid itself of the rear half of the old skin. The front portion presented greater difficulties. Here the mouth parts and the two front pairs of legs, which includes the longest pair are to be extricated. The second pair of legs were removed by pulling them up and backward out of the old skin covering. The mouth parts are next extricated. A bending of the body sharply up at the junction of the thorax and abdomen seemed to aid most. After repeating this process a few times with straining and tensing of the muscles the head and mouth parts slipped out. The only unextricated part now was the front pair of legs. These were the most difficult to remove from the old skin. The spider mite twisted, turned, pulled, pushed, and tried every conceivable movement in its efforts. The process which finally proved successful was to raise the thorax slightly and then place the second pair of legs against the old skin. By pushing with this second pair of legs and pulling with the first pair the mite extricated its front legs. It did not appear to be exhausted as a result of its labor but immediately wandered about a short interval of time and then settled down to feed.

Mating Habits.

At another time several male spider mites were observed in a group apparently fighting or struggling desperately. A female in the process of its last molt was noted in their midst. As it went through this process the males congregated close around and often tried to mate with it. As soon as it was free of its last skin one male gained the supremacy and mated with the newly molted female. The other males soon left and the female started to feed. This congregating of the males around the females about to emerge seems to be characteristic of this arachnid. The method of mating is interesting. The male approaches the female from the rear, burrows under her and then raises his abdomen and bends it at a sharp angle over his back until the genital openings meet.

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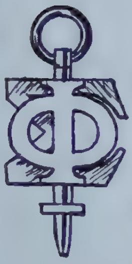

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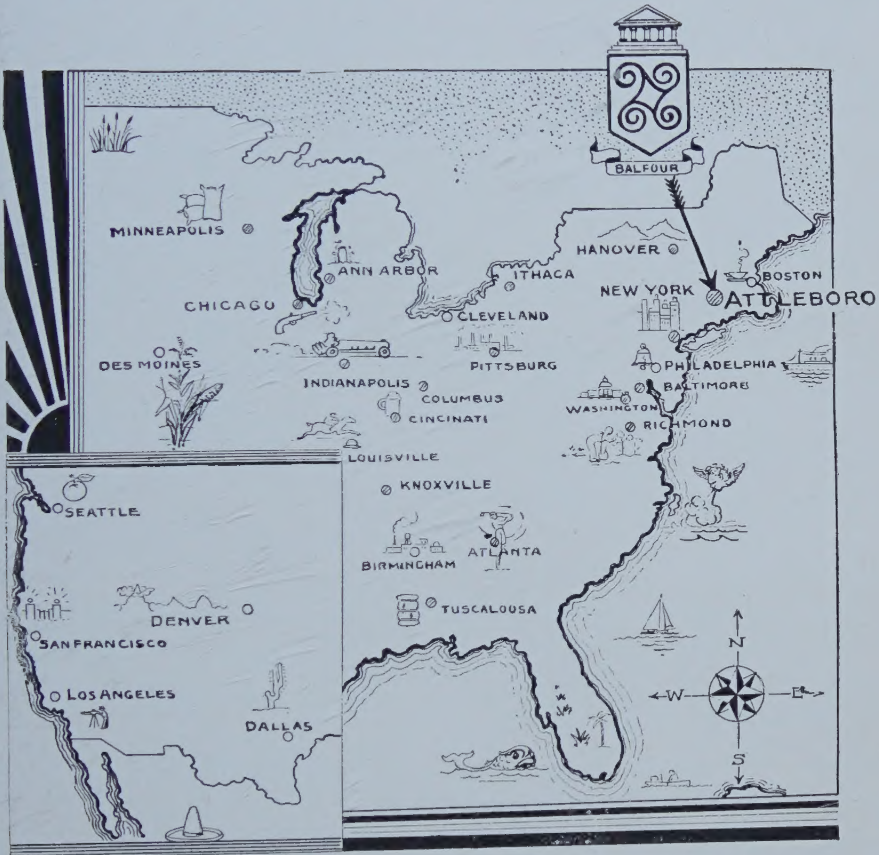

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